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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,644	11/26/2003	Laurent Stefani	144724	7327
7590 John S. Beulick Armstrong Teasdale LLP Suite 2600 One Metropolitan Square St. Louis, MO 63102			EXAMINER CHENG, JACQUELINE	
			ART UNIT 3768	PAPER NUMBER
			MAIL DATE 11/28/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/722,644

Applicant(s)

STEFANI ET AL.

Examiner

Jacqueline Cheng

Art Unit

3768

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed October 2, 2007 have been fully considered but they are not persuasive. The examiner respectfully disagrees with the applicant's arguments that neither Drummond or Devito, considered alone or in combination, describes or suggests the method as is recited in claim 1. Although Drummond does not explicitly state selecting an imaging exam configured to produce a 3D dataset representing at least one portion of the heart during at least one phase, it would be obvious that in order to produce the first and second volumes of cardiac data as disclosed in Drummond at least one portion of the heart must be decided upon as the region of interest to image (selecting a portion). This portion would depend on the type of disease being studied or the type of analysis one was trying to make. In fact, even if the entire heart was being analyzed and therefore imaged, this would still be selecting at least a portion of the heart. In the same manner Drummond discloses imaging of the heart throughout all of its phases which is selecting at least one phase to image. Drummond does also disclose selecting to image one particular phase. The invention of Drummond comprises an imaging system including an EKG gated acquisition to image the heart free of motion which would require selecting a particular phase to image. Therefore the examiner believes the rejection dated May 3, 2007, repeated below, still stands.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1, 2, 9-13, 17, 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Drummond (US Patent 6,628,743 B1) in view of Devito (US Patent No. 5,421,331).

4. Drummond discloses a method for acquiring and analyzing cardiac data of a patient in which a cardiac 3D dataset (from any well known medical scanner such as a CT with a detector array, radiation source and a workstation coupled to a computer) is received and is processed by various algorithms, one being a region growing algorithm, to determine a volume of a ventricle of a heart. This volume rendering can be done at any specified phase of the cardiac cycle (which to process the volume at any of the specified phases, a selection of the phase must first be received). This volume rendering is one of the cardiac datasets that are collected to use to help to diagnose the heart for heart diseases such as myocardial perfusion analysis (abstract, col. 1 line 46-53, col. 3 line 13-50, col. 5 line 16-21, col. 9 line 46-57).

5. What Drummond does not disclose is calculating at least one of a short axis or long axis without user intervention. Drummond does disclose depicting short axis and long axis images, so to depict these images the short and/or long axis must be known. This might be done, for example if the diagnosis of the heart consists of a myocardial

perfusion analyses. In myocardial perfusion analyses it is conventional practice to reference the position of a tissue region to the long axis of the left ventricle. Devito discloses that to automate this process would improve the diagnostic utility of a myocardial perfusion study, so therefore it would be obvious to one skilled in the art to combine Devito with Drummond in order to further the diagnostic utility of Drummond by determining the long axis without user intervention through Devito (Devito, col. 1 line 31-47).

6. Devito discloses automatically identifying the long axis of the left ventricle to improve the diagnostic utility of a myocardial perfusion study from a 3D dataset (col. 1 line 44-47) with a program that runs on a computer. The computer does this by first identifying the entire heart from the 3D image data and segments out the left ventricle by reconstructing a set of transverse slices of it. A representative slice of the left ventricle is then selected and a first estimate of the long axis is determined. The computer then identifies and constructs line segments from the local maxima and local minima. The resulting line, element 44 of fig. 6, shows the first estimate. The second estimate is then taken by using the calculated maxima and minima to determine points in which to fit a line through their centers for the second estimate of the long axis (col. 4 line 48-col. 5 line 40)

7. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Drummond in view of Devito as applied to claim 1 above, and further in view of US Publication No. 2003/0153823 A1 (herein referred to as Geiser). Geiser discloses that the long axis of a heart can include the aorta and the atrium as well as the ventricle

(paragraph 0027). Therefore it would be obvious to one with ordinary skill in the art at the time of the invention to segment out the atrium and aorta along with the left ventricle as the area to be identified, the long axis, could include areas of the aorta and atrium. It would be obvious to one skilled in the art at the time of the invention to combine Geiser with Drummond and Devito to further the utility of determining the long axis.

8. Claims 4-8, 14-16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Drummond in view of Devito as applied to claims 1 and 12 above, and further in view of US Patent No. 6,217,520 B1 (herein referred to as He). It would be obvious to one with ordinary skill in the art at the time of the invention to combine He with Drummond and Devito as the inventions are to the same art of automatic extraction of an object of interest from the heart and would make Devito more useful by producing an accurate border of the heart.

9. **Claims 4 and 14:** He discloses that the images can be taken at the end of diastole period, which would be close to 75% of an R to R interval (col. 7 line 54-57).

10. **Claim 5, 6, 15, and 19:** He discloses that it is well known in the art to use an axis of inertia to estimate the long axis. This is done through calculating the axis of least second momenta which is the axis of least inertia (col. 6 line 40-67). So although Devito discloses determining the first estimate by using local maxima and local minima, it would be obvious to use any type of estimate of the long axis such as an estimate using the axis of inertia. As for selecting a right extremity point as the first point for the second estimate, the right most point depends on the orientation of the heart and the image. If the image of the slice is viewed as the heart is orientated, with the open u part (where the



aorta and atrium connect above the ventricle) at the top, the midway point of the line connecting the ends of the maxima (element 52 of fig. 8) is the right extremity point.

11. **Claims 7, 8, 16, and 20:** Devito et al. discloses that after the centerline is determined, it is known that the long axis lies in a plane that includes this centerline. This plane is perpendicular to the transverse slice and so the image is resliced along the determined plane, resulting in sagittal slices. The selected sagittal slice used would have the center of inertia for that point must lie along the long axis. The centerline of the new slice is then estimated and this new long axis estimate is combined with the transverse long axis estimate to determine the long axis location (col. 5 line 58-col. 6 line 27).

### *Conclusion*

12. This is a request for continued examination. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

13. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

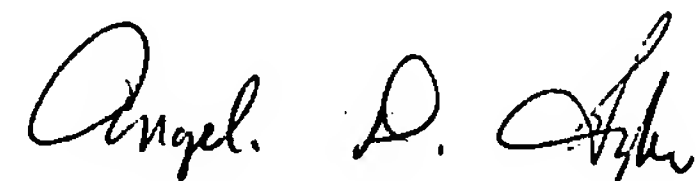
advisory action. In no, however, event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacqueline Cheng whose telephone number is 571-272-5596. The examiner can normally be reached on M-F 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JC



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